www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(11): 170-173

www.thepharmajournal.com
Received: 05-09-2021
Accepted: 12-10-2021

HK Rahangdale
MGCGVV, Chitrakoot Satna, Madhya Pradesh, India

SP Mishra
MGCGVV, Chitrakoot Satna, Madhya Pradesh, India

A Duggal
MGCGVV, Chitrakoot Satna, Madhya Pradesh, India

SS Shukla
JNKVV, Jabalpur, Madhya Pradesh, India

GK Rana
MGCGVV, Chitrakoot Satna, Madhya Pradesh, India

Corresponding Author:
HK Rahangdale
MGCGVV, Chitrakoot Satna, Madhya Pradesh, India

Assessment of nutritional and sensory properties of biscuits prepared from wheat and linseed flour

HK Rahangdale, SP Mishra, A Duggal, SS Shukla and GK Rana

Abstract
The investigation carried out to fortify flaxseed at different levels was assessed on the both nutritional and sensory attributes of biscuits. The flaxseed as functional ingredient was incorporated by substituting refined wheat flour at 5%, 10%, 15%, 20% 25%, 35% and 40% respectively in biscuits. Incorporation of flaxseed flour up to 20% in biscuits were found to be more acceptable with the sensory score 7.9 out of 10 point hedonic scale was found superior to other one. A novel fortified biscuits was successfully produced and it was observed as the concentration of flaxseed increased the fat, ash, protein, fibre, EV, Ca and P meanwhile the carbohydrates were decreased. Moreover, the other nutritional parameters than its oil content, make it more favourable choice for baking industries to develop functional foods.

Keywords: Flaxseed, baked products, assessment, nutritional and sensory

Introduction
The bakery products, biscuits are most significant. These are an important food product used as snacks by children and adults in India. However these are most commonly relished by school going children, who need more protein per unit body weight than adults. Biscuits hold an important position in snack foods due to variety in taste, crispiness and digestibility. These are popular among all age groups especially in children. Commercially available cookies are prepared from white flour that is nationally inferior to whole wheat flour. Biscuits are characterized by long shelf life and are available everywhere and at any time (Nakov G *et al.*, 2016) [12].

There are possibilities for the production of dietetic biscuits with sugar replacement, using fats with different characteristics, as well as enrichment of biscuits with different functional components Lourencetti *et al.* (2013) [10].

Wheat (Triticum spp.) is the important and staple crop of the people in India and around the globe because of fundamental source of calories and nutrients mainly used for milling and baking. It contains moisture 12.8%, protien 11.8%, fat 1.5%, minerals 1.5%, crude fibre 1.2%, carbohydrates 71.2%, Energy value 346 Kcal, Calcium 41mg/100g, Phosphorus 306 mg/100g and Iron 5.3 mg/100g respectively Gopalan *et al.* (2000) [7] and Rana (2020) [14].

The flaxseed (*Linum usitatissimum* L.) is Latin name it means "very useful", and it has two basic varieties: brown and yellow or golden (also known as golden linseeds). Flaxseed is emerging as an important functional food ingredient because provides oil rich in omega-3, digestible proteins, and lignans. In addition to being one of the richest sources of α-linolenic acid oil and lignans, flaxseed is an essential source of high quality protein and soluble fibre and has considerable potential as a source of phenolic compounds Daun *et al.* (2003) [5].

The food industry produces a number of co-products with high nutritional value and great potential for reuse. A number of studies using industrial residues from food processing have been performed with this purpose (Santos *et al.*, 2011) [16] and Yoshiara *et al.*, 2012) [20].

Methods and Materials
The present investigation was undertaken on "Assessment of Nutritional and Sensory Properties of Biscuits Prepared from Wheat and Linseed Flour Blend" at MGCGVV, Chitrakoot, Satna (M.P.), India.

Experimental materials
The wheat and pea was procured from the local market and all other ingredients (sugar, vegetable oil, glucose, ammonium bicarbonate, common salt sodium bicarbonate, vanilla and

baking powder) were purchased from the retail market and department. The materials were transported to department.

Preparation biscuits through selected wheat and pea sprouted grains: ***Processing of selected grains*****:** The grains (wheat and pea) were washed and cleaned to remove the dirt, dust and foreign matter by winnowing.

Development and standardization of baked products (Biscuits)
First of all studies were conducted to standardize the formulation for the development of the different cereal-pulses based baked products. Biscuits were processed using the traditional creamery method described by Whitley (1970) [19].

Proximates analysis
Moisture, carbohydrates, Protein, Fat and Ash in samples were estimated by method as prescribed in AOAC (1984) [3].

Estimation of Minerals
Mineral content of biscuits were estimated through the Gopalan table values (Gopalan *et al.* 2000) [7].

Energy Value
The total energy values were estimated with using the values of 4, 4, and 9 for protein, carbohydrate and fat respectively as follows:
Total energy (kcal/100g) = [(% available carbohydrates x 4) + (% protein x 4) + (% fat x 9)].

Sensory evaluation
The organoleptic properties of nutritious wheat linseed based biscuits were evaluated by the Amerine *et al.*, (1965) [2].

Statistical analysis: The obtained data for various parameters were subjected to statistically analysis in order to assess the degree of variation within the treatments as compared to the control. The data were subject to analysis of variance (ANOVA) and the least significance difference to estimate the difference between means through STATA 14.0 software. The Completely Randomized Design (CRD) at 5% level of significant.

Results and Discussion
Proximate composition of wheat and linseed biscuits:
Moisture content
The data regarding moisture content of combination of wheat and linseed based biscuit of moisture content of a food is of great significances for many scientific and economic reasons. Moisture content of the wheat based biscuits are (4.55%). The moisture contents ranges from 3.85 to 4.90 per cent. The results of table 2 showed that biscuits with T6 treatment had the lowest moisture content 3.85 per cent while biscuits with T2 treatment had the highest moisture content 4.90 per cent. Lesser the moisture content of biscuits better is storage stability. Similar work done by Man *et al.*, (2021) [11].

Carbohydrates content
The carbohydrates content of wheat and linseed based biscuit products ranged from 90 days highest in T2 treatment (63.57%) and least in T8 treatment (50.08%) are presented in Table 2. The higher and lower values with respect to above constituents were also reported by several investigators Rao *et al*. (1984) [15], Dreher and Patek (1984) [6].

Protein content
The protein content of wheat and linseed based biscuit products ranged highest in T8 treatment (14.84%) and least in T2 treatment (12.39%) are presented in Table 2. The increase in the level of linseed flour in the biscuit significantly increases the protein content of the biscuits. The above results were well supported by many workers Semwal *et al*. (1996) [17] and Agu *et al*. (2007) [1].

Fat content
The fat content of wheat and linseed based biscuit products ranged from 3.32% T2 treatment and least in T8 treatment (14.91%) are presented in Table 2. The increase in the level of linseed flour in the biscuit increases fat content significantly in the biscuits. The above results were well supported by many workers Semwal *et al*. (1996) [17] and Agu *et al*. (2007) [1].

Fibre content
The fibre content of wheat and linseed based biscuit products ranged from 3.65% in T8 treatment and least inT2 treatment (3.16%) 19. The increase in the level of linseed flour in the biscuit increases fibre content significantly in the biscuits. Above results were well supported by many workers Semwal *et al*. (1996) [17] and Agu *et al*. (2007) [1].

Ash content
The ash content of wheat and linseed based biscuit products ranged from T8 treatment (5.18%) and least in T2 treatment (2.04%) are presented in Table 2. An increase in the linseed flour in biscuits increases the ash content of the biscuits. Similar result was reported by Butt *et al*. (2004) [4].

Calcium (Ca) content
The calcium content of wheat and linseed based biscuit products ranged from highest in T8 treatment (76.66 mg) and least in T2 treatment (28.44 mg) are presented in Table14. An increase in the linseed flour in biscuits increases significantly the calcium content of the biscuits. The above results were well supported by many workers Semwal *et al*. (1996) [17] and Agu *et al*. (2007) [1]).

Iron (Fe) content
The iron content of wheat and linseed based biscuit products ranged from 2.52 mg T2 and least in T3 & T4 treatment (2.54 mg) are presented in Table18. The above results were well supported by many workers Semwal *et al*. (1996) [17], Agu *et al*. (2007) [1].

Phosphorous (P) content
The phosphorous content of wheat and linseed based biscuit products ranged highest in T8 treatment (206.74mg) and least in T2 treatment (125.07 mg) are presented in Table 2. The increase in the level of linseed flour in the biscuit significantly increases the phosphorous content of the biscuits. The above results were well supported by many workers Semwal *et al*. (1996) [17] and Agu *et al*. (2007) [1].

Energy value
The energy value of wheat based biscuits was found to be in T1 (327.92 kCal). The energy value of wheat and linseed based biscuit products ranged highest in T2 treatment (336.35 kCal) and least in T8 treatment (395.43kCal) are presented in Table 2. The increase in the level of linseed flour in the

biscuit significantly increases energy content in the biscuits.

Sensory score combination of the wheat and linseed biscuit

Appearance

The maximum appearance was found to be in treatment T2 (7.35) whereas minimum appearance was found to be in treatment T7 (6.60). Appearance was found to be significantly higher in wheat based biscuit. More darkness in the colour of biscuit was observed ass the level of supplementation was increased in the wheat flour may be subjected to the dark brown colour of the linseed as well as due to Maillard reaction between sugar and proteins Raidl and Klein, (1983) [13] and Hussain *et al*,. (2006) [9].

Colour

Scores for colour of wheat and linseed based biscuit ranged from 5.98 to 6.91 in colour. The maximum colour was found to be in treatment T5 (6.91) whereas minimum colour was found to be in treatment T8 (5.98) as depicted in table 2. Colour was found to be significantly lower in wheat based biscuit. Similar issue were found Raidl and Klein, (1983) [13] and Hussain *et al*, (2006) [9].

Crispiness

Sensory scores of wheat and linseed based biscuit ranged from 7.03 to 7.95 in crispiness. The maximum crispiness was found to be in treatment T5 (7.95) whereas minimum crispiness was found to be in treatment T8 (7.03). Crispiness was found to be significantly lower in wheat based biscuit. Results are also supported by the findings of other works by Hooda and Jood, (2005) [8] and Hussain *et al.* (2006) [9].

Taste

As per table 2 taste of wheat based biscuit were found to be in treatment T1 (7.20). Sensory scores of wheat and linseed based biscuit ranged from 6.57 to 7.32 in taste. The maximum taste was found to be in treatment T3 (7.32) whereas minimum taste was found to be in treatment T8 (6.57).Taste was found to be significantly lower in wheat based biscuit. Our results support the findings of other works Hooda and Jood, (2005) [8] and Hussain *et al.* (2006) [9].

Texture

Sensory scores of wheat and linseed based biscuit ranged from 6.73 to 7.59 in texture. The maximum texture was found to be in treatment T5 (7.59) whereas minimum texture was found to be in treatment T8 (6.73).Texture was found to be significantly higher in wheat based biscuit as depicted in table 2. Results are supported by other works Hooda and Jood, (2005) [8] and Hussain *et al.* (2006) [9].

Overall Acceptability

Sensory scores of wheat and linseed based biscuit ranged from 6.69 to 7.59 in overall acceptability. The maximum overall acceptability was found to be in treatment T5 (7.59) whereas minimum overall acceptability was found to be in treatment T8 (6.69). Overall acceptability was found to be non-significantly lower in wheat based biscuit. Vaidehi *et al*., (1985) [18] developed cereal: pulse malt biscuits and compared with control biscuits for appearance, texture and overall acceptability.

Conclusion

Flax seed flour increased the protein, ash, fat, fibre and minerals content of the developed biscuits. The slight increase in moisture was found in the fortified samples. The colour of the fortified samples attained darker colour as the fortification was increased. On the basis of nutritional and sensory quality, cookies when fortified with blends of 20% flax seed resulted in better quality and nutritious biscuits (carbohydrate content 58.22%, protein content 134.4%, and fat content 18.31%).

References

1. Agu HO, Ayo JA, Paul AM, Folorunsho F. Quality characteristics of biscuits made from wheat and African breadfruits (*Treculia africana*). Nigerian Food Journal 2007;25(2):19-27.
2. Amerine MA, Pangborn RM, Rosseier EB. Principles of sensory evaluation of food. Academic press, London 1965.
3. AOAC. Official methods of analysis 14th Edn. Association of Official Agricultural Chemists. Washington DC 1984.
4. Butt, MS, Sharif K, Huma N, Mukhtar T, Rasool J. Storage studies of red palm oil fortified cookies, Nutrition & Food Science 2004;34(6):272-276.
5. Daun JK, Barthet VJ, Chornick TL, Duguid S. Structure, composition, and variety development of flaxseed. Flaxseed in human nutrition Thompson LU, Cunnane SC 2003,1-40.
6. Dreher ML, Patek JW. Effect of supplementation of short bread cookies with roasted whole navy bean flour and high protein flour. J Food science 1984;49(3):922.
7. Gopalan C, Ramasastry BV, Balasubramanian SC. Nutritive Value of Indian Foods, National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, India 2000,47-48.
8. Hooda S, Jood S. Organoleptic and nutritional evaluation of wheat biscuits supplemented with untreated and treated fenugreek flour 2005;90(3):427-435.
9. Hussain S, Anjum FM, Butt MS, Khan MI, Asghar A. Physical and sensoric attributes of flaxseed flour supplemented cookies. Turk J. Biol 2006;30:87-92.
10. Lourencetti ER, Benossi L, Marques RD, Joia MB, Monteiro GRA. Development of biscuit type cookie with partial replacement of fat by inulin, International Journal of Nutrition and Food Sciences 2013;2(5):261-265.
11. Man SM, Stan L, Paucean A, Chis MS, Muresan V, Socaci SA *et al*. Nutritional, Sensory, Texture Properties and Volatile Compounds Profile of Biscuits with Roasted Flaxseed Flour Partially Substituting for Wheat Flour, Applied Sciences 2021;11(11):4791.
12. Nakov G, Stamatovska V, Necinova L, Ivanova N, Damyanova S. Sensor analysis of functional biscuits, Ukrainian Food Journal 2016;5(1):56-61.
13. Raidl MA, Klein BP. Effects of soy or field pea flour substitution on physical and sensory characteristics of chemically leavened quick breads. Cereal Chemistry 1983;60:367-370.
14. Rana GK. A Competitive book of Food Science and Technology/Agricultures for JRF, SRF, NET, ARS, Ph. D, BHU, CFTRI, NIFTEM and other examinations, Jain brothers, New Delhi, ISBN-978-81-8360-239-5 2020,1-280.
15. Rao BR, Rajor RB, Patil GR. Formulation of protein rich biscuits from jowar, soybean and skim milk, J Food Sci.

Technol 1984;21:236.
16. Santos CA, Ribeiro RC, Silva EVC, Silva NS, Silva BA, Silva GF *et al*. Elaboration of biscuit flour buriti (*Mauritia flexuosa* L.F.) without added oat (Avena sativa L.). Revista Brasileira de Tecnologia Agroindustrial 2011;5(1):262-273.
17. Semwal AD, Narasimhamurthy MC, Arya SS. Composition of some commercially available biscuits. J Food Sci. and Tech 1996;32(2):112-115.
18. Vaidehi MP, Kumari MS, Joshi N. Sensory evaluation of cereal-pulse based malt biscuits with high protein value. Cereal Foods World 1985;30:283-285.
19. Whitley PR. Biscuit Manufacture, Applied Science Publisher, London, UK 1970,53-67.
20. Yoshiara LY, Madeira TB, Delaroza F, Silva JB, Ida EI. Optimization of soy isoflavone extraction with different solvents using the simplex-centroid mixture design. International Journal of Food Sciences and Nutrition 2012;63(8):978-986.